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Effective on 12/08/2004. Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818). FEE TRANSMITTAL For FY 2007		Complete if Known	
		Application Number	10/601,652-Conf. #1286
		Filing Date	June 24, 2003
		First Named Inventor	Masatoshi YOKOTA
		Examiner Name	A. A. Hunter
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27	Art Unit	3711	
TOTAL AMOUNT OF PAYMENT	(\$) 500.00	Attorney Docket No.	0754-0192P

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FEE CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

<u>Total Claims</u>	<u>Extra Claims</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>
-	=	x	=

HP = highest number of total claims paid for, if greater than 20.

<u>Indep. Claims</u>	<u>Extra Claims</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>
-	=	x	=

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

<u>Total Sheets</u>	<u>Extra Sheets</u>	<u>Number of each additional 50 or fraction thereof</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>
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4. OTHER FEES(S)

Non-English Specification, \$130 fee (no small entity discount)

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		Date	April 30, 2007



TRANSMITTAL OF APPEAL BRIEF

Docket No.
0754-0192P

In re Application of: Masatoshi YOKOTA

Application No.
10/601,652-Conf. #1286

Filing Date
June 24, 2003

Examiner
A. A. Hunter

Group Art Unit
3711

Invention: GOLF BALL

TO THE COMMISSIONER OF PATENTS:

Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed: February 28, 2007

The fee for filing this Appeal Brief is \$ 500.00

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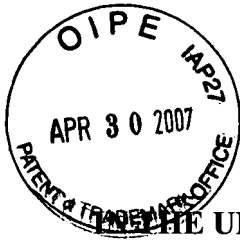
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Dated: April 30, 2007



Docket No.: 0754-0192P
(PATENT)

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Masatoshi YOKOTA

Application No.: 10/601,652

Confirmation No.: 1286

Filed: June 24, 2003

Art Unit: 3711

For: GOLF BALL

Examiner: A. A. Hunter

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As required under § 41.37(a), this brief is filed subsequent to the Notice of Appeal filed in this case on February 28, 2007, and is in furtherance of said Notice of Appeal. This Appeal Brief is respectfully submitted in response to the final rejection of claims 1, 2, 4, 6, 7, 9 and 11-16 dated September 28, 2006.

The fees required under § 41.20(b)(2), including fees for extension of time until April 30, 2007, for filing of this Appeal Brief, are addressed in the accompanying TRANSMITTAL OF APPEAL BRIEF.

05/01/2007 JADD01 00000010 022448 10601652
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Application No.: 10/601,652
Art Unit 3711
April 30, 2007

Docket No.: 0754-0192P

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I. REAL PARTY IN INTEREST

The real party in interest (owner of all right and title in the claimed invention) for this appeal is:

SRI SPORTS, LTD.

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II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no other appeals, interferences, or judicial proceedings that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

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III. STATUS OF CLAIMS

Claims 1, 2, 4, 6, 7, 9 and 11-16 are currently pending. Claims 3, 5, 8 and 10 are cancelled. No claims are withdrawn from consideration as being drawn to a non-elected invention. No claims are allowed. Claims 1, 2, 4, 6, 7, 9 and 11-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wu, U.S. Patent No. 5,908,358 (hereinafter "Wu"), in view of Iwami et al., JP 2002-078824 (hereinafter, "Iwami et al."). Claims 1, 2, 4, 6, 7, 9 and 11-16 are on appeal. Claims 1, 6 and 13 are independent claims.

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IV. STATUS OF AMENDMENTS

The Office Action of September 28, 2006 finally rejecting claims 1, 2, 4, 6, 7, 9 and 11-16 remains outstanding. The Final Office Action of September 28, 2006 was issued in response to Appellants' reply under 37 C.F.R. § 1.111 of July 20, 2006. Claims 1, 6 and 13 are amended by an Amendment filed December 28, 2006, said amendment being entered into the record according to the Advisory Action of February 1, 2007.

Claims 1, 2, 4, 6, 7, 9 and 11-16 are shown in the Claims Appendix as they presently stand in the prosecution of the present application.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention, as defined in independent claim 1, is directed to a golf ball cover. The golf ball cover has a specific composition and specific properties governed by the composition, as disclosed by the present specification. Each element of the golf ball cover of claim 1 is supported by the specification as follows.

The cover is:

made from a cover material including a cured product of a thermosetting resin composition containing a thermosetting urethane resin composition; (*page 4, lines 20-28*)

the thermosetting urethane resin composition comprises an isocyanate group-terminated urethane prepolymer and a polyamine compound; (*page 5, lines 2-6*)

the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate; (*page 5, lines 7-21*)

the polyamine compound contains 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane; (*page 7, lines 1-24*)

the stiffness modulus of the cover material is 80 to 260 MPa; (*page 4, lines 10-13*) and

the stiffness modulus and shore D hardness of the cover material satisfy the following equation:

$$2.0 \leq A/B \leq 5.0, 40 \leq B \leq 55$$

A: Stiffness modulus (MPa)

B: Shore D hardness (*page 3, lines 20-26, and page 4, lines 4-6*).

The present invention, as defined in independent claim 6, is also directed to a method of producing a golf ball, wherein said golf ball has a cover. The golf ball cover has a specific composition and specific properties governed by the composition, as disclosed by the present specification. The golf ball cover is made from a material which includes a cured product of thermosetting resin. (*See, Specification, at page 4, lines 20-28*). Each step and the associated elements of the method of producing a golf ball cover according to claim 6 is supported by the specification as follows.

selecting a cover material satisfying the following equation:

$$2.0 \leq A/B \leq 5.0$$

$$40 \leq B \leq 55$$

A: Stiffness modulus (MPa)

B: Shore D hardness; (*page 18, line 6 to page 21, line 11, page 3, lines 20-26 and page 4, lines 4-6*) and

covering a ball body with the cover material, (*Id.*) wherein

the cover is made from a cover material including a cured product of a thermosetting resin composition containing a thermosetting urethane resin composition; (*page 4, lines 20-28*)

the thermosetting urethane resin composition comprises an isocyanate group-terminated urethane prepolymer and a polyamine compound; (*page 5, lines 2-6*)

the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate; (*page 5, lines 7-21*)

the polyamine compound contains 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane; (*page 7, lines 1-24*) and

the stiffness modulus of the cover material is 80 to 260 MPa. (*page 4, lines 10-13*)

Independent claim 13 is directed to a golf ball similar to the golf ball of independent claim 1. However, claim 13 uses the language "consisting essentially of" in the phrase "the thermosetting urethane resin composition consists essentially of an isocyanate group-terminated urethane prepolymer and a polyamine compound. . ." The remained of independent claim 13 is essentially the same as independent claim 1 and therefore relies on the same support found in the specification as cited for independent claim 1. That is, claim 13 is directed to a golf ball comprising a cover, as in independent claim 1, and each element of the golf ball cover of claim 13 is supported by the specification as follows:

made from a cover material including a cured product of a thermosetting resin composition containing a thermosetting urethane resin composition; (*page 4, lines 20-28*)

the thermosetting urethane resin composition consists essentially of an isocyanate group-terminated urethane prepolymer and a polyamine compound; (*page 5, lines 2-6*)

the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate; (*page 5, lines 7-21*)

the polyamine compound contains 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane; (*page 7, lines 1-24*)

the stiffness modulus of the cover material is 80 to 260 MPa; (*page 4, lines 10-13*) and the stiffness modulus and shore D hardness of the cover material satisfy the following equation:

$$2.0 \leq A/B \leq 5.0, 40 \leq B \leq 55$$

A: Stiffness modulus (MPa)

B: Shore D hardness (*page 3, lines 20-26, and page 4, lines 4-6*).

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VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The sole ground of rejection to be reviewed on appeal is whether claims 1, 2, 4, 6, 7, 9 and 11-16 are patentable under 35 U.S.C. § 103(a) over the combined disclosures of Wu and Iwami et al.

VII. ARGUMENT

Claims 1, 2, 4, 6, 7, 9 and 11-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wu in view of Iwami et al. Appellants submit that the Examiner fails to establish *prima facie* obviousness of the invention as set forth in claims 1, 2, 4, 6, 7, 9 and 11-16 and furthermore that the record provides objective evidence of unobviousness of the invention sufficient to rebut any possible case of *prima facie* obviousness that might be deemed established by the cited references. Accordingly, the instant rejection must be reversed.

A. The Examiner fails to establish *prima facie* obviousness of the claimed invention.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. (*See, In re Vaack*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991)).

1. The Examiner's statement of the rejection

The Examiner states that Wu discloses or suggests a thermosetting urethane golf ball cover wherein the thermosetting urethane resin composition comprises an isocyanate group-

terminated urethane prepolymer and a polyamine compound covering a core having a Young's modulus of from about 5000 to 100000 psi and examples of golf balls having a cover with Shore D hardness of 51 to 58, and argues that a modulus of at least 102 to 116 MPa would satisfy a ratio of the modulus to the hardness of 2.0 or more. (*See*, Office Actions of November 4, 2005, at page 2 and September 28, 2006, at page 2).

The Examiner states that "Wu '358 shows examples of golf balls in which bear the cover of the present invention wherein it is shown that the covers have a hardness of 51 to 58 Shore D," and "[f]rom the above, a modulus of at least 102 to 116 would satisfy applicant's criteria." (*See*, Office Action of November 4, 2005, at page 2). The Examiner thus seems to indicate that Table 1 of Wu discloses a cover having a Shore D of between 51 to 58 and a modulus of between 102 and 116.

The Examiner admits that Wu does not disclose or suggest limiting the polyurethane to the types of isocyanates recited in the presently pending independent claims, *i.e.*, claim 1 recites, in part, "the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate." (*Id.*).

However, the Examiner cites to Iwami et al. as disclosing or suggesting this limitation. (*Id.* at page 3). The Examiner states that Iwami et al. disclose or suggest "isocyanate group-terminated urethane prepolymer and a polyamine wherein the isocyanates are 4,4'-dicyclohexylmethane diisocyanate, isophorone diisocyanate, etc., and the polyamine desired is

4'-diaminodiphenylmethane and derivative thereof where 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane is noted as being a derivative thereof.” (*Id.*, citing to paragraphs [0018] to [0026] of Iwami et al.).

The Examiner then concludes it would have been obvious to one of ordinary skill in the art to combine the composition of Wu with the polyamine of Iwami et al. to achieve the presently claimed invention to improve thermal resistance, and to use the isocyanates of Iwami et al. to improve weatherability, water resistance and resilience. (*Id.*, at page 3).

2. The combined references fail to teach or suggest all of the features of the claimed invention.

The cited references fail to disclose or suggest the advantageous relationship between Shore D and stiffness modulus as recited in independent claims 1, 6 and 13. That is, independent claims 1, 6 and 13 recite that “the stiffness modulus and shore D hardness of the cover material satisfy the following equation: $2.0 \leq A/B \leq 5.0$, $40 \leq B \leq 55$.” Thus, the golf ball cover of the present invention has a Shore D hardness (B) of 40 to 55 and the ratio of the stiffness modulus (A) to the hardness (B), that is, (A/B), falls within the range of 2.0 to 5.0, which provides the golf ball of the present invention with an improved abrasion resistance, improved shot feel, and improved flight performance balancing controllability. (*See*, for instance, specification at Table 2 and page 2, line 25 to page 3, line 17).

Wu does not disclose or suggest the relationship of stiffness modulus and Shore D hardness, which provides the excellent characteristics of a golf ball having a cover according to

the presently claimed invention. The disclosure of Iwami et al. also does not disclose or suggest these limitations.

The present invention is directed to a golf ball having a stiffness modulus different from the Young's modulus of the cited reference. According to the presently claimed invention, a golf ball having excellent characteristics can be obtained only by a combination of the stiffness modulus having 80-260 MPa and the value of A/B being between 2.0 and 5.0 (A/B being the ratio between the stiffness modulus and the Shore D hardness).

Thus, the disclosure of Wu cannot be directly compared with that of the present invention simply because the modulus values calculated by use of the equation recited by claims 1, 6 and 13 fall within the stiffness modulus range as also recited by claim 1, "the stiffness modulus of the cover material is 80 to 260 MPa."

The above values cannot be calculated accurately based on the disclosure of the cited references. Since Wu does not even recite stiffness modulus, it would be impossible to derive stiffness modulus for improving the controllability. Even if this value could be derived from Young's modulus, it is clear that the relationship between the stiffness modulus and the Shore D hardness could not be derived even if both references were considered in combination.

Furthermore, Comparative Examples 11 and 15 in Table 3 at page 24 of the present specification employ acceptable stiffness and hardness properties based on the ranges and examples described in Wu. These Comparative Examples are summarized at page 25 of the specification as follows:

In the golf balls No. 8 to 16, the stiffness modulus and Shore D hardness of the cover material did not satisfy the equation of the present invention. In the golf ball No.8, the shore D hardness of the cover material was 65, thus the hardness of the resultant cover was extremely high. As a result, the controllability was lowered due to the low-spin rate. Further, the shot feeling of the golf ball was lowered. In the golf balls No. 9 and 10, the shore D hardness of the cover material was less than 40, the repulsion property of the resultant golf ball became lowered, thus the flight distance was short. Especially, in the golf ball No.9, since the ratio of the stiffness modulus (A) to the Shore D hardness (B) A/B was 0.8 and the stiffness modulus to the Shore D hardness was extremely small, the flight distance was so short. In the golf ball No. 11, the ratio (A/B) was 5.2, the stiffness modulus was too large relative to Shore D hardness. Thus, spin rate was lowered, resulting in the low controllability of the golf ball. Further, the shot feeling of the golf ball was bad, because the stiffness modulus of the golf ball was too large.

In the golf balls No. 12 to 15, the ratio (A/B) of each golf ball was less than 2.0, the flight distance was short, and the abrasion resistance and the shot feeling had the tendency to become lowered. Further, the coloring-resistance was remarkably lowered, because the aromatic isocyanate was used as the isocyanate component of the isocyanate group terminated polyurethane prepolymer.

Consequently, it is clear that Wu fails to provide any reasonable suggestion towards obtaining the present invention such that a person skilled in the art would have to engage in undue experimentation without sufficient guidance. Furthermore, Wu fails to recognize the advantages associated with the golf ball of the present invention with regard to advantageously improved controllability and shot feeling properties.

The Examiner refers to a Young's modulus of 5,000 to 100,000 psi (34.5 MPa according to the Examiner) and a Shore D hardness of 51 to 58 in Wu, and argues that a modulus of at least 102 to 116 MPa would satisfy a ratio of the modulus to the hardness of 2.0 or more. (See, Office Action of September 28, 2006, at page 2).

Table 1 of Wu discloses several finished golf balls, the covers of which have a Shore D hardness of 50 (Tour Balata), 51 (Example 2), 58 (Example 1) and 59 (Professional). (*See*, Wu, at page 5). According to Table 1, the shear resistance of the cover having a hardness of 58 or 59 is, respectively, a rating of 1 (no marks, no damage) or 2 (marked, no cut), which suggests that a hardness of 58 to 59 improves shear resistance of the cover. (*Id.* and at column 9, lines 1-45).

However, the shear resistance of the cover having a hardness of 50 or 51 reveals, respectively, a rating of 6 (cover cuts and cover peels) or 1 (no marks, no damage), which suggests that hardness itself, being in the range of 50 to 51, does not correlate with, or is not related to, shear resistance of the cover.

Furthermore, Wu does not disclose or suggest any effect that would have been achieved if, as the Examiner argues, a ratio of the Young's modulus to the Shore D hardness of 2.0 or more had been investigated.

In contrast, in the presently claimed golf ball cover having a Shore D hardness (B) within a range of 40 to 55 (even if the presently claimed cover has a Shore D hardness of 51 or less, in which the hardness of Wu does not correlate with shear resistance), if the ratio of the stiffness modulus (A) to the Shore D hardness (B), that is, (A/B) , is in the range of 2.0 to 5.0, this improves not only the abrasion resistance of the cover, but also the controllability and shot feeling of the cover. (*See*, specification, disclosing the results of Ball Nos. 1, 2, 6 and 7 in Table 2).

Additionally, even if the cover of the present invention has a Shore D hardness of 59, wherein the Shore D hardness actually improves shear resistance, if the ratio of the stiffness

modulus to the Shore D hardness (A/B) is outside of the range of 2.0 to 5.0, then the abrasion resistance, controllability and shot feeling would be detectably lowered. (*See*, specification, Ball No. 11, in Table 3).

Therefore, even if the Young's modulus and the Shore D hardness of Wu could be applied to a golf ball cover as presently claimed, the unexpected and remarkable results of the presently claimed invention would not be achieved unless the cover were made to have a Shore D hardness of 40 to 55 and unless the ratio of the stiffness modulus to the Shore D hardness were made to be within the range of 2.0 to 5.0. However, Wu and even Iwami et al., fail to recognize this limitation or the importance thereof to the unexpected qualities achieved in the presently claimed invention.

Thus, at least for this reason, the Examiner's rejection should be reversed since the Examiner has not established a *prima facie* case of obviousness because the cited references do not disclose or suggest, either considering the disclosures individually or in combination, all of the limitations of the presently claimed invention because none of the references disclose or suggest a golf ball cover including a cured product of a thermosetting resin composition containing a thermosetting urethane resin composition comprising: an isocyanate group-terminated urethane prepolymer containing an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate; and 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane. (*See, In re Vaeck*).

3. *There is a lack of Motivation to Combine the Disclosures of Wu and Iwami et al. and Wu Teaches Away From the Presently Claimed Invention*

Appellants submit that there is no motivation provided by the prior art references or the state of the art to modify the disclosure of the primary reference of Wu in the manner of Iwami et al. so as to derive the instant invention as recited in claims 1, 6 and 13.

In rejecting claims under 35 U.S.C. § 103(a), it is incumbent on the Examiner to establish a factual basis to support the legal conclusion of obviousness. (*See, In re Fine*, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988)). In so doing, the Examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.* and to provide a reason why one of ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. (*Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. 459, 467 (1966)).

The Office Actions to date and of record in the present application are devoid of any such analysis, such as is required under *Graham v. John Deere Co.* Thus, on its face, the record falls short of establishing a *prima facie* case of obviousness of claims 1, 6 and 13.

Such reasoning must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. (*See, Uniroyal Inc. v. F-Wiley Corp.*, 837 F.2d 1044, 1051, 5 U.S.P.Q.2d 1434, 1438 (Fed. Cir. 1988), *cert. denied*, 488 U.S. 825 (1988)). The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art

suggested the desirability of the modification. (*See, In re Fritch*, 972 F.2d 1260, 1266, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992)).

“The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.” (*See, Alza Corp. v. Mylan Pharma., Inc.*, 2006 U.S. App. LEXIS 22616, *9, 8 U.S.P.Q.2d 1001 (Fed. Cir. 2006), and *In re Kotzab*, 217 F.3d 1365, 1370, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000)).

(A) No Motivation in Prior Art to Select the Specifically Recited Young’s Modulus

Referring to the Examiner’s comments concerning the disclosure of Wu, above, Appellant directs the Boards’ attention to the fact that Wu only discloses a Young’s modulus of an extremely large range of between 34.5 to 689.5 MPa. Accordingly, Wu only discloses a very large range of relationships between Young’s modulus and hardness of 0.6(34.5/58) – 13.5(689.5/51). There is no other disclosure in Wu that would lead one of ordinary skill in the art to specifically select the recited range of the modulus of 102-116 MPa or that this particular range could yield the results of the present invention from within this extremely broad range of variables having unpredictable outcomes. There would be no expectation that any specific narrow range could possibly yield dramatically advantageous properties, as discovered by the Appellant, and as discussed in further detail, below.

(B) No Motivation in the Prior Art to Select the Specifically Recited Curing Agent

Claims 1, 6 and 13 provide that 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane is used as a curing agent of the thermosetting urethane resin composition. (See, specification, at page 7, lines 22-24). This polyamine compound provides a cover having superior durability since the polyamine compound reacts moderately with the isocyanate group-terminated urethane prepolymer.

The Examiner refers to the disclosure of Iwami et al. to find this limitation. (See, Office Action of September 28, 2006, at page 3). The Examiner states that:

Iwami discloses a golf ball having a cover of a polyurethane composition made of a isocyanate group-terminated urethane prepolymer and a polyamine wherein the isocyanate are 4,4'-dicyclohexylmethane diisocyanate, isophorone diisocyanate, etc., and the polyamine desired is 4'-diaminodiphenylmethane and derivatives thereof.

(*Id.*). The Examiner continues to state that Appellant's recited compound, 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane, is one of the derivatives broadly encompassed by this vague disclosure in Iwami et al. The Examiner cites to a section of Iwami et al., paragraphs [0018] to [0026], which discloses a large laundry list of species encompassed by the genus disclosed.

The court has consistently held that such vague, broad and generic disclosures of large genres encompassing a myriad number of species are insufficient to form the basis of a *prima*

facie case of obviousness. (See, *In re Petering*, 301 F.2d 676, 681 (CCPA 1962), and *Impax Lab's, Inc. v. Aventis Pharma., Inc.*, 468 F.3d 1366 (Fed. Cir. 2006), stating that when “a reference discloses a class of compounds, *i.e.*, a genus, a person of ordinary skill in the art should be able to ‘at once envisage each member of th[e] . . . class’ for the individual compounds, *i.e.*, species, to be enabled,” emphasis in original, citing *In re Petering*). Thus, the Examiner’s reference to this broad disclosure in Iwami et al. is insufficient.

(C) Wu Specifically Teaches Away from the Presently Claimed Invention

The Examiner states that, “[t]he only thing that would make Wu teach away from ‘consisting essentially of’ is if the epoxy material effect the basic novel characteristic of the polyurethane.” (See, Office Action of November 4, 2005, at page 3). However, referring to the disclosure of Wu, it can be confirmed that the epoxy curing agent greatly affects the properties of the obtained polyurethane resin compound.

Specifically, it is clear that in Wu, Example 3, without any epoxy curing agent, detrimental shear resistance is observed. (See, Wu, at column 9, table and lines 14-22). Therefore, omitting this compound would destroy the intended purpose of Wu, thus, there is no motivation to use other curing agents instead of the epoxy curing agent. In other words, the epoxy curing agent does change the properties of the urethane resin composition as shown in Table 9 of column 9 of Wu. Hence, the properties of the cover formed with or without the epoxy curing agent are clearly different, even in the case of golf balls using the same urethane components. Since the subject of Wu is the use of the epoxy curing agent as claimed, a cover

composed of a polyurethane resin composition which does not contain an epoxy curing agent cannot achieve the object of Wu, and accordingly, Wu clearly teaches away from the present invention.

The Examiner also states that “Wu ‘358 notes that the invention may be made of a polyurethane prepolymer with a polyamine curing agent or a bifunctional glycol and epoxy curing agent,” “Wu ‘358 implies that the same result may be obtained even without using the epoxy curing agent.” (*Id.*).

However, this is not the standard for obviousness, as described above. Furthermore, the Examiner misunderstands the disclosure of Wu. Wu actually implies that while a prepolymer and epoxy curing agent are essential components, the polyamine and bifunctional glycol are chosen optionally. (*See*, Wu at column 6, lines 15-19). If interpreted any other way, there is no reason why the claimed invention of Wu defines the epoxy curing agent.

Wu discloses a golf ball having a urethane cover that is formed using an epoxy curing agent. The cover may be formed from a thermosetting or thermoplastic polyurethane composition and the Young’s modulus of the cover is in the range of 5,000-100,000 psi (converting to 34.5-689.5 MPa). This is described at column 2, lines 35-45 and column 5, lines 8-22. Wu further discloses at the bottom of column 6 to the top of column 7 that the golf ball cover is formed to have a Shore D hardness value at the end of the intermediate curing step of 10-30. Wu discloses at Table 1 examples of the invention wherein the cover has a Shore D hardness of 51 and 58.

Wu clearly states that using an organic curing agent having at least one epoxy group materially affects the properties of the golf ball cover composition described therein based on the conclusions drawn with respect to the comparative test results at column 9, lines 14-22. Here, Wu points out that golf balls which employ compositions without an epoxy curing agent exhibit disadvantageous, inferior properties when compared to the inventive examples which employ an epoxy curing agent.

In this regard, a claimed combination cannot change the principle of operation of the primary reference or render a reference inoperable for its intended purpose. (*See*, M.P.E.P. §§ 2143.01, sections entitled “The Proposed Modification Cannot Render the Prior Art Unsatisfactory For Its Intended Purpose” and “The Proposed Modification Cannot Change the Principle of Operation of a Reference,” and M.P.E.P. § 2145(III)). The Federal Circuit has also held: “If references taken in combination would produce a ‘seemingly inoperative device,’ we have held that such references teach away from the combination and thus cannot serve as predicates for a prima facie case of obviousness.” (*See, McGinley v. Franklin Sports Inc.*, 60 U.S.P.Q.2d 1001, 1010 (CAFC 2001), citing *In re Spinnoble*, 405 F.2d 578, 587, 160 U.S.P.Q. 237, 244 (CCPA 1969), holding that references teach away from combination if combination produces seemingly inoperative device; and *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984), finding that an inoperable modification teaches away).

(D) Conclusion

Thus, for at least this additional, independent reason, the Examiner has failed to establish a *prima facie* case of obviousness because the references, even upon combination, fail to provide sufficient motivation to select the very specific criteria and limitations recited in the present claims. For this additional reason, the Board should reverse the Examiner's rejections.

4. *Modification of the Cited References Amounts to Improper Hindsight Reconstruction or "Templating"*

The Examiner's rejection should be reversed based on this additional, independent ground. That is, to so drastically modify the disclosure of any of the two references cited by the Examiner, and to add elements not present in either of the cited references, amounts to improper hindsight reconstruction.

To assert the presently alleged case of *prima facie* obviousness, it is clear that the Examiner has dissected bits and pieces from each of the two references, each reference directed at solving different problems, to identify each element of the present claims and then combined these bits and pieces together using the claims as a template in an attempt to create the method defined by independent claims 1, 6 and 13. Thus, through a process of hindsight reconstruction using the Appellants' disclosure, which has been often rebuked by the Courts, the Examiner is improperly modifying and reconstructing the disclosures of the references to a point that they are taken entirely out of context to achieve the methods of the presently claimed invention. (*See, Grain Processing Corp. v. American Maize-Products Co.*, 840 F.2d 902, 907, 5 U.S.P.Q.2d

1788, 1792 (Fed. Cir. 1988), stating, “Care must be taken to avoid hindsight reconstruction by using ‘the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit,’” (internal citation omitted); and *In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), stating “One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.”).

As recently held in *Alza Corp.*, the Federal Circuit has consistently held that an Examiner cannot use the claim of the Appellant “as a template . . . selecting elements from references to fill the gaps.” (*Alza Corp.*, at *6, and *In re Gorman*, 18 U.S.P.Q.2d 1885, 1888 (Fed. Cir. 1991), *see also*, *Interconnect Planning Corp. v. Feil et al.*, 227 U.S.P.Q. 543, 551 (Fed. Cir. 1985), stating, “[t]he claims were used as a frame, and individual naked parts of separate prior art references were employed as a mosaic to recreate a facsimile of the claimed invention.”).

If Wu fails to disclose or suggest: [i] the specific isocyanate component, [ii] the relationship between stiffness and hardness properties “A/B”, and [iii] the selected stiffness modulus range of 80-260 MPa, then how does one skilled in the art arrive at the present invention without a great deal of experimentation and no direction for the experiments? Note that the fact that the claimed invention is within the capabilities of one of ordinary skill in the art fails to be sufficient in establishing prima facie obviousness. (*See, In re Kotzab*, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000); MPEP 2143.01, Rev. 2, May 2004, page 2100-131). Also note that the mention of a stiffness range of 102-116 MPa by the Examiner is based completely on

hindsight and fails to be suggested as being any different than the remaining broad range of 34.5-101 and 117-689.5 MPa of Wu.

Thus, for at least this additional, independent reason, the Examiner has failed to establish a *prima facie* case of obviousness because the Examiner is participating in improper hindsight reconstruction in using Appellant's own claims as a template on which to assemble unrelated disclosures and references. For this additional reason, the Board should reverse the Examiner's rejections.

B. Appellant has provided sufficient evidence of unexpected results to rebut any possible obviousness rejection.

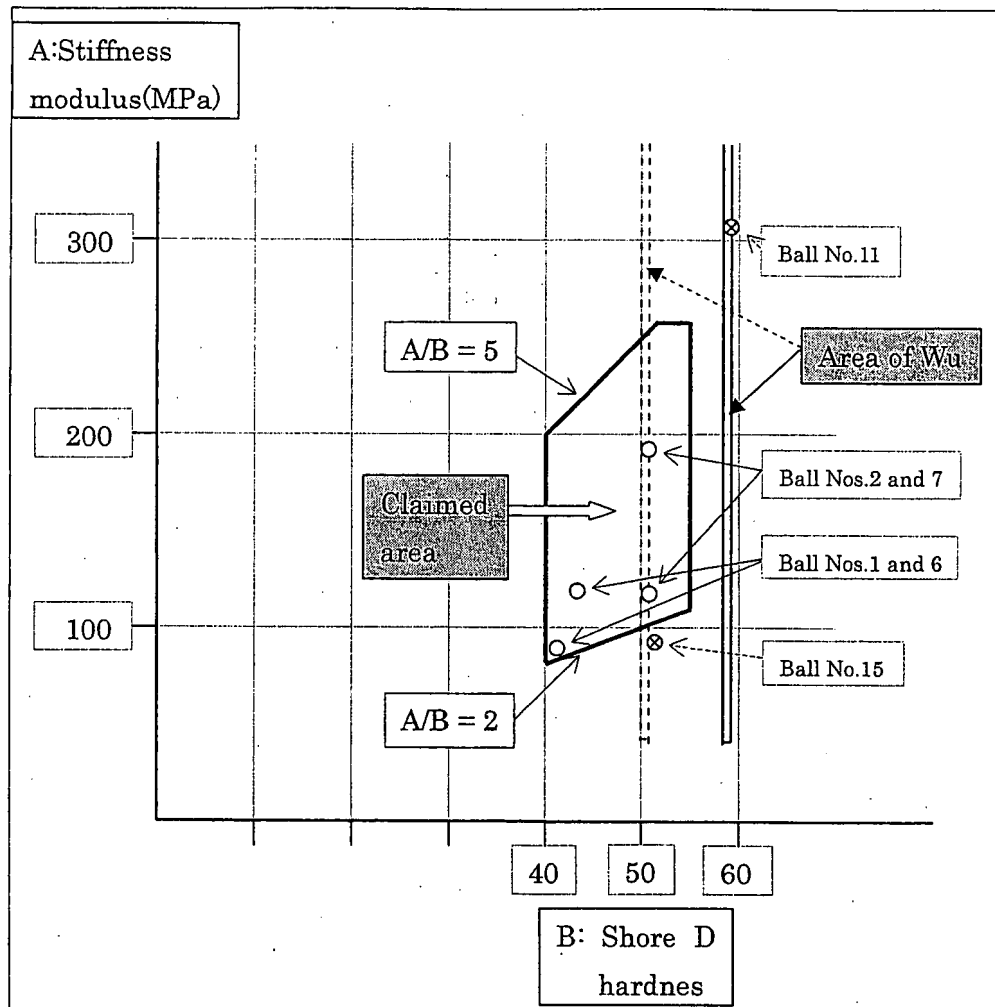
As stated in the M.P.E.P. at § 716.02, “[a] greater than expected result is an evidentiary factor pertinent to the legal conclusion of obviousness ... of the claims at issue.” (See, M.P.E.P., at § 716.02, citing *In re Corkill*, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985)). The M.P.E.P. further states that, “[e]vidence of a greater than expected result may also be shown by demonstrating an effect which is greater than the sum of each of the effects taken separately (*i.e.*, demonstrating “synergism”).” (See, *Id.*, citing *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989)).

The present invention is directed to a golf ball with a cover formed from a cured product of a thermosetting resin composition wherein the stiffness modulus (MPa) and Shore D hardness properties satisfy the relationships recited in claim 1. Significantly, the Appellant has discovered an unexpected relationship between the stiffness modulus and hardness properties of the golf ball

cover. Evidence of the unexpectedly advantageous properties exhibited by golf balls of the present invention is evidenced by the comparative tests results shown in Tables 2-4 at pages 22-26 of the present specification.

Specifically, note that Examples 1-7 (present invention) in Table 2 all provide for excellent ("E") or at least good ("G") controllability and shot feeling properties. In contrast, the various Comparative Examples 8-18 exhibit predominantly poor controllability and shot feeling properties. Note especially Comparative Examples 11 (308 MPa stiffness; 59 Shore D hardness; and A/B ratio of 5.2) and 15 (90 MPa stiffness; 52 Shore D hardness; and A/B ratio of 1.7) which both exhibit only poor ("P") or fair ("F") controllability and shot feeling properties.

Comparative Examples 11 and 15 have only acceptable golf ball cover stiffness and hardness properties according to Wu discussed below. The differences between the unexpected properties of the presently claimed invention as compared to that disclosed in Wu may be visualized more accurately by reference to Figure 1, below.



The golf ball having the above disclosed cover yields a golf ball with an unexpectedly superior controllability, shot feel, durability and flight performance, as shown in the embodiments of the present invention, and which could not be obtained with the conventional golf ball cover.

Appellant has discovered that the claimed golf ball unexpectedly exhibits a “good shot” feel and an excellent controllability compared to that of golf balls having a Balata rubber cover. The presently claimed golf ball cover also provides great durability and flight performance,

similar to golf balls having an ionomer cover, but without using a thermoplastic resin or an organic fiber as a cover material. (*See*, specification, at page 2, lines 13 to 17). As further evidenced by Tables 2 to 4, at pages 22 to 26 of the present specification, the golf ball of the presently claimed invention has superior features and excellent properties.

The relationships and effectiveness of the above ranges are clearly disclosed by the present specification at, for instance, Tables 2-4. For example, Ball Nos. 1-7 in Table 2 all provide for Excellent (E) or good (G) controllability and shot feeling properties. On the other hand, for example, Ball No. 11 (308 MPa and A/B ratio of 5.2) and Ball No. 15 (90 MPa and A/B ratio of 1.7) in Table 3 exhibit poor (P) or fair (F) controllability and shot feel. Further, Ball No. 8 (296 MPa and A/B ratio of 4.6) does not improve the controllability and shot feeling property regardless of the fact that the stiffness modulus falls within the range as recited by the equation in claims 1, 6 and 13.

(A) Appellant has Disclosed Objective Qualities of Test Results Showing Unexpected Results

Among the unexpected properties of the presently claimed invention are the “controllability” and “shot feeling” properties included in the comparative tests described at pages 15-27 of the present specification.

Regarding “controllability”, it is submitted that the actual tests employed in connection with comparing this property corresponded to the following:

“excellent”: distance of “run” was less than 2 yards;

“good”: distance of “run” was 2-4 yards;

“fair”: distance of “run” was 4-6 yards; and

“poor”: distance of “run” was more than 6 yards.

The “run” was the distance that the golf ball traveled after initially striking the target surface. Thus, this property was measured in an objective manner, though all the specific details regarding the objectivity of this test were not detailed at page 17 of the present specification. Rather, the number of golfers applying this objective standard was reported.

Regarding “shot feeling”, it is true that this property clearly includes a large subjective component, since this property is essentially a complete evaluation by the golfer of other properties including deformation amount, hardness distribution, etc. However, “shot feeling” has been employed in connection with other comparative tests and other U.S. patents. Note for example: [1] USP 6,241,625 (column 15); [2] USP 6,386,993 (column 7); and [3] USP 6,716,116 (column 5). Thus, testing for this property is accepted within the industry and the results of these tests should be given a reasonable amount of credibility by the Patent Examiner.

Another property reported in the present specification which includes an objective basis is “abrasion resistance”. This property was evaluated based on the following:

“excellent”: surface of golf ball had no flaws;

“good”: surface of golf ball had 1 line (i.e. a linear shaped flaw made by a golf club head face groove) with a length of less than 3 mm;

“fair”: surface of golf ball had 1 or 2 lines (defined above) with a length of more than 3 mm; and

“poor”: surface of golf ball had more than 3 lines (defined above) with a length of more than 3 mm.

In view of the above, it is submitted that the comparative tests described in the present application have a reasonably objective basis and should be given a reasonable amount of credibility by the Patent Examiner.

Neither reference discloses the unexpected improvement in controllability, shot performance, durability and flight performance achieved by the present invention through selection of the recited variable ranges. These disclosed ranges can not be predicted from the prior art nor are they suggested by the prior art.

Thus, Appellant has proven to the Examiner, through objective data, that only a cover having the features as recited by claims 1, 6 and 13 can achieve the unexpectedly superior results of the present invention. (*See*, Supplemental Reply of May 17, 2005). These test results clearly demonstrate the superiority of the golf ball of the present invention.

(B) Comparison of Appellant’s Disclosure to Wu and Iwami et al.

Furthermore, Wu does not disclose or suggest any effect that would have been achieved if, as the Examiner argues, a ratio of the Young’s modulus to the Shore D hardness of 2.0 or more had been investigated.

In contrast, in the presently claimed golf ball cover having a Shore D hardness (B) within a range of 40 to 55 (even if the presently claimed cover has a Shore D hardness of 51 or less, in which the hardness of Wu does not correlate with shear resistance), if the ratio of the stiffness

modulus (A) to the Shore D hardness (B), that is, (A/B) , is in the range of 2.0 to 5.0, this improves not only the abrasion resistance of the cover, but also the controllability and shot feeling of the cover. (See, specification, disclosing the results of Ball Nos. 1, 2, 6 and 7 in Table 2). Neither Wu nor Iwami et al. disclose or suggest this advantageous feature, nor do they even contemplate there might be a relationship between these variables such that finding the best combination would yield such advantageous properties.

Additionally, even if the cover of the present invention has a Shore D hardness of 59, wherein the Shore D hardness actually improves shear resistance, if the ratio of the stiffness modulus to the Shore D hardness (A/B) is outside of the range of 2.0 to 5.0, then the abrasion resistance, controllability and shot feeling would be detectably lowered. (See, present specification, Ball No. 11, in Table 3).

Therefore, even if the Young's modulus and the Shore D hardness of Wu could be applied to a golf ball cover as presently claimed, the unexpected and remarkable results of the presently claimed invention would not be achieved unless the cover were made to have a Shore D hardness of 40 to 55 and unless the ratio of the stiffness modulus to the Shore D hardness were made to be within the range of 2.0 to 5.0. However, Wu and even Iwami et al., fail to recognize this limitation or the importance thereof to the unexpected qualities achieved in the presently claimed invention.

(C) Conclusion

Thus, even if the Young's modulus and the Shore D hardness of the cover in Wu were combined, as proposed by the Examiner and considered, *arguendo*, above, with the isocyanates and the polyamines disclosed or suggested in the urethane resin of the cover of Iwami et al., the resultant combination would still not achieve the unexpectedly superior properties of the cover of the presently claimed invention.

Appellant thus respectfully submits that the present invention has achieved unexpected and superior results, whereby such results rebut any possibly asserted *prima facie* case of obviousness. (*See, In re Corkill*, 711 F.2d 1496, 226 U.S.P.Q. 1005 (Fed. Cir. 1985); *see also In re Papesch*, 315 F.2d 381, 137 U.S.P.Q. 43 (CCPA 1963); *In re Wiechert*, 370 F.2d 927, 152 U.S.P.Q. 247 (CCPA 1967), and M.P.E.P. § 2144.09, section entitled "*Prima Facie* Case Rebuttable By Evidence of Superior or Unexpected Results"), any rejection under 35 U.S.C. § 103(a) may be rebutted by a sufficient showing of unexpected results for the present invention).

C. Patentability Of Dependent Claims 2, 4, 7, 9, and 12-16

Claims 2 and 7

This claim recites an advantageous feature of the invention, described on page 3 of the specification. Despite the Examiner's vague citations of disclosure in Wu, Appellant can find no disclosure in Wu or Iwami et al. suggestive of the limitation recited in claims 2 and 7. For

example, Appellant finds no mention whatsoever in Wu of a Shore D hardness, let alone a value of between 2.0 and 4.0 for the Shore D hardness of a golf ball cover.

Claims 4 and 9

This claim recites an advantageous feature of the invention, described on page 4. Despite the Examiner's vague citations of disclosure in Wu, Appellant is at a loss to find in Wu or Iwami et al., a disclosure of an A/B ratio, as defined in the present specification, of between 45 and 55.

Claims 11 and 12

Claims 11 and 12 employ the language “consisting essentially of” instead of “comprises” in referring to the isocyanate group-terminated urethane prepolymer and the polyamine compound recited in claims 1 and 6, respectively. This language thus excludes additional components that materially affect the properties of the claimed composition, such that these claims clearly exclude the epoxy curing agent required by Wu which, as noted above, Wu clearly establishes materially affect the golf ball cover composition properties. Appellant can find no disclosure whatsoever of this limitation in either Wu or Iwami et al., in addition to finding insufficient support for the disclosure of independent claim 1.

Claims 14-16

Claims 14-16 further limit claims 1, 6 and 13, respectively, to a golf ball cover having a thickness of from 0.2 to 1.5 mm and is supported in the specification at, for instance, page 10.

The specification explains this important feature of the presently claimed invention as follows:

By making the thickness of the polyurethane cover thinner than 1.5 mm, which is thinner than that of the conventional cover, it is possible to prevent the resilience from being lowered by employing the relatively soft polyurethane cover. However, if the thickness of the cover is less than 0.2 mm, it will be difficult to form the polyurethane cover, because the thickness is too thin. Even if the polyurethane cover having the thickness of less than 0.2 mm can be formed, the tear-strength of the resultant polyurethane cover is low. Thus, the polyurethane cover will be easily torn or worn by the impact or contact with the clubface. In extreme cases, the solid core would be exposed.

C. Conclusion

In conclusion, Appellants respectfully submit that it has been shown that the Examiner has failed to properly establish that the rejected claims are *prima facie* obvious according to 35 U.S.C. § 103(a) in light of the disclosures of the cited references of Wu and Iwati et al. Alternatively, Appellant submits that the specification and prosecution history include objective evidence sufficient to rebut any case of *prima facie* obviousness that might be deemed established by the combination of the cited references.

Thus, for the reasons advanced above, it is respectfully submitted that claims 1, 2, 4, 6, 7, 9 and 11-16 are allowable. Favorable reconsideration and reversal of the Examiner's rejection of claims 1, 2, 4, 6, 7, 9 and 11-16 under 35 U.S.C. § 103(a), by the Honorable Board of Patent Appeals and Interferences, are respectfully solicited.

Application No.: 10/601,652
Art Unit 3711
April 30, 2007

Docket No.: 0754-0192P

VIII. CLAIMS APPENDIX

A copy of the claims involved in the present appeal is attached hereto as Appendix A.

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Art Unit 3711
April 30, 2007

Docket No.: 0754-0192P

IX. EVIDENCE APPENDIX

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the Examiner is being submitted.

Application No.: 10/601,652
Art Unit 3711
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Docket No.: 0754-0192P

X. RELATED PROCEEDINGS

None.

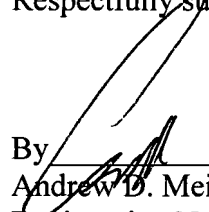
Application No.: 10/601,652
Art Unit 3711
April 30, 2007

Docket No.: 0754-0192P

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: April 30, 2007

Respectfully submitted,

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 10/614,857:

1. A golf ball comprising a cover,
wherein the cover is made from a cover material including a cured product of a thermosetting
resin composition containing a thermosetting urethane resin composition;
the thermosetting urethane resin composition comprises an isocyanate group-terminated urethane
prepolymer and a polyamine compound;
the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed
by at least one diisocyanate compound selected from the group consisting of 4,4'-
dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone
diisocyanate;
the polyamine compound contains 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane;
the stiffness modulus of the cover material is 80 to 260 MPa; and
the stiffness modulus and shore D hardness of the cover material satisfy the following equation:

$$2.0 \leq A/B \leq 5.0, 40 \leq B \leq 55$$

A: Stiffness modulus (MPa)

B: Shore D hardness.

2. A golf ball according to claim 1, wherein the stiffness modulus and shore D hardness of the cover material satisfy the following equation:

$$2.0 \leq A/B \leq 4.0.$$

4. A golf ball according to claim 1, wherein the shore D hardness of the cover material is 45 to 55.

6. A method of producing a golf ball having a cover made from a material including a cured product of thermosetting resin composition comprising:
selecting a cover material satisfying the following equation:

$$2.0 \leq A/B \leq 5.0$$

$$40 \leq B \leq 55$$

A: Stiffness modulus (MPa)

B: Shore D hardness; and

covering a ball body with the cover material, wherein

the cover is made from a cover material including a cured product of a thermosetting resin composition containing a thermosetting urethane resin composition;

the thermosetting urethane resin composition comprises an isocyanate group-terminated urethane prepolymer and a polyamine compound;

the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate;

the polyamine compound contains 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane; and

the stiffness modulus of the cover material is 80 to 260 MPa.

7. The method according to claim 6, wherein the stiffness modulus and shore D hardness of the cover material satisfy the following equation:

$$2.0 \leq A/B \leq 4.0.$$

9. The method according to claim 6, wherein the shore D hardness of the cover material is 45 to 55.

11. A golf ball according to claim 1, wherein the thermosetting urethane resin composition consists essentially of the isocyanate group-terminated urethane prepolymer and the polyamine compound.

12. The method according to claim 6, wherein the thermosetting urethane resin composition consists essentially of the isocyanate group-terminated urethane prepolymer and the polyamine compound.

13. A golf ball comprising a cover,
wherein the cover is made from a cover material including a cured product of a thermosetting resin composition containing a thermosetting urethane resin composition;
the thermosetting urethane resin composition consists essentially of an isocyanate group-terminated urethane prepolymer and a polyamine compound;
the isocyanate group-terminated urethane prepolymer contains an isocyanate component formed by at least one diisocyanate compound selected from the group consisting of 4,4'-dicyclohexylmethane diisocyanate, cyclohexane diisocyanate and isophorone diisocyanate;
the polyamine compound contains 3,3'-diethyl-5,5'-dimethyl-4,4'-diaminodiphenylmethane;
the stiffness modulus of the cover material is 80 to 260 MPa; and
the stiffness modulus and shore D hardness of the cover material satisfy the following equation:

$$2.0 \leq A/B \leq 5.0, 40 \leq B \leq 55$$

A: Stiffness modulus (MPa)

B: Shore D hardness.

14. A golf ball according to claim 1, wherein the cover has a thickness of 0.2 to 1.5mm.

15. A method according to claim 6, wherein the cover has a thickness of 0.2 to 1.5mm.

16. A golf ball according to claim 13, wherein the cover has a thickness of 0.2 to 1.5mm.